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**1. General information**

The MBS 900 "monitor operating station", in connection with the periphery card ETR 94 E, offers a multi-purpose control system for central operation and monitoring of the plant (Figure 1). It is connected to the cards of the Multi-Control System via an RS 485 interface (2-wire connection). Rapid data exchange via the interface facilitates simultaneous operation and monitoring of all connected control circuits (max. 60 zones). The control circuits function entirely independently. An alarm (e.g. target/performance deviation) is portrayed immediately on the MBS and saved, together with the alarm start time and finish time. All parameters in the control circuits can be altered via the keyboard. The interface for the periphery cards has bus capabilities. An additional interface facilitates connection to a host computer. The third (optical) interface is integrated in the housing front in a contactless form (Figure 2).

The MBS 900 consists of an aluminium housing. There is a large, clear LED display on the front panel with background illumination, and a user-friendly membrane keyboard divided according to function groups. The MBS can be installed directly in the front of the control panel, or in a 19" housing. The power pack and processor card are situated in the interior. In the event of a power cut, the main data are buffered via a battery.

With recipe management, it is possible to save the parameters for each product, such as target values, alarm values, input limits etc.

If a product change is implemented, it is only necessary to load the recipe stored for that product. This means that it is not necessary to re-set the target values and parameters. Accordingly, incorrect operation in the event of a product change is virtually excluded. Operation of the MBS 900 can be locked via various access levels (codes). This ensures that only authorised personnel are able to alter parameters in the MBS, thereby preventing operation by unauthorised personnel.

Figure 1

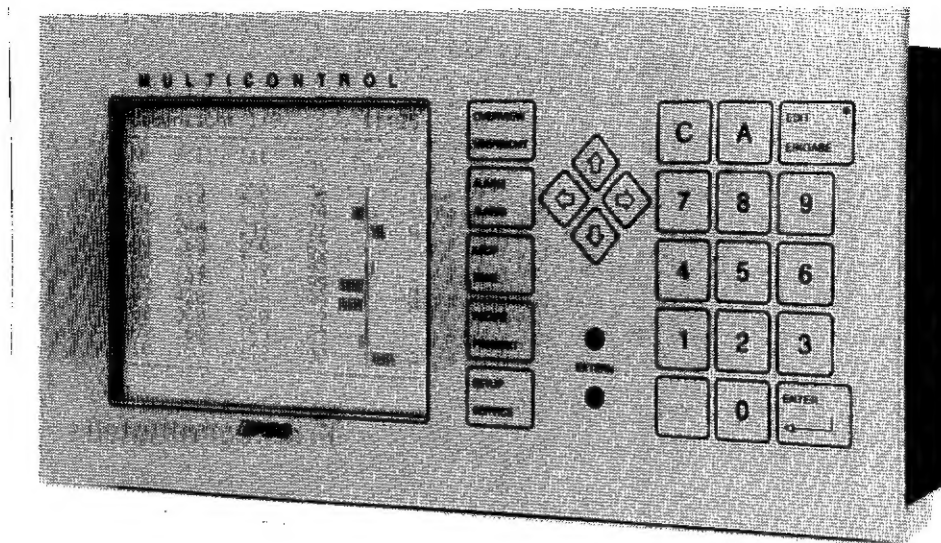
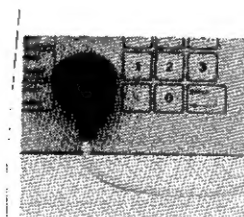
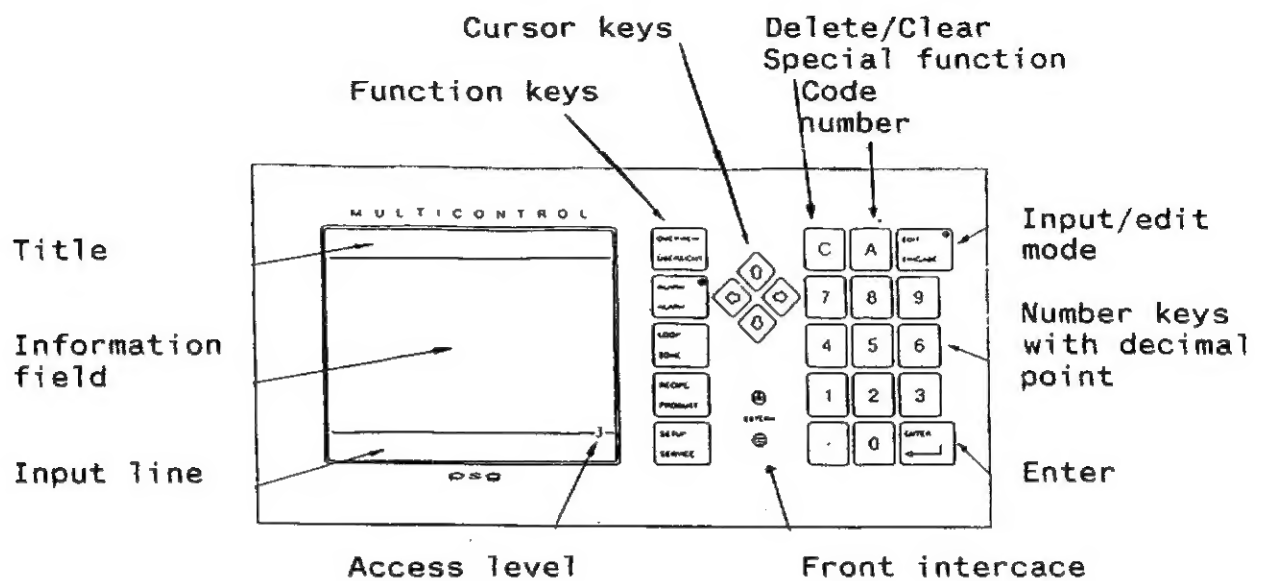


Figure 2



## 2. Front layout and operation



All operation is divided into 4 access levels (code levels). Enabling of each level (i.e. permitted alteration facilities) is conducted by entering a code no. This is displayed on the screen beneath the access level. Various accesses can be locked for the operator with the aid of the code number. Alteration of the code levels is implemented in the SET-UP/SERVICE menu under the menu point Service/Code.

This basic level is always active, if fno code-no. is entered. From every higher level the MBS automatically goes back to this basic level after 15 minutes, if no operation is done.

## Two-digit numerical code no. XX

Four-digit numerical code no. XXXX

Six-digit numerical code no. XXXXXX

It is only possible to activate the operating level SET-UP/SERVICE and implement alterations to it and change the parameters in the LOOP/ZONES menu in block form with the six-digit code no. (code level three).

At the factory, the number 0 has been set for all code levels.

In order to switch to another access level (code level), press <A>. The words "Code no." will appear in the input line, followed by the input cursor to indicate that the system is ready for input (Figure 4). The four-digit or six-digit code no. (depending on the access code level) is entered via the numerical keyboard; the entered code no. is not visible on the display. Once the code number has been entered, this should be confirmed with <ENTER>. The words "Code no." will disappear and the selected code level will appear in the access level (see Figure 4). In the event of a typing error or entry of an incorrect code no., the system will always return to the lowest level (code level 1).

Code no.: \_\_\_\_\_

## 2.2 Entering values

In order to alter values, first press the <INPUT/EDIT> key. The green LED will then be illuminated to indicate that the operator is in edit mode. The first line or value which can be altered is portrayed inversely in the information field (marker bar). The value on which the marker bar is currently positioned and which can be altered will appear in the input line (Figure 5). It is possible to approach another changeable value with the cursor keys.

The first digit of the value to be altered will appear in the input line. This can be simply altered. Each input must be acknowledged with <ENTER>. When entering values with decimal point, the value after the decimal point is automatically set to zero unless a decimal point is entered. In the case of values which can only be switched on or off, switching is implemented by pressing a numerical key.

You exit the edit mode by pressing <INPUT/EDIT> again. However, this also occurs automatically if no keys are actuated for approximately 2 minutes.

In the edit mode, it is also possible to approach other values on another page using the cursor controls. The exceptions to this are input in the overview mask and deletion of the alarm list. In these cases, it is only possible to approach the values to be altered with the cursor on one page. In order to select another page, it is first necessary to exit the edit mode by pressing <INPUT/EDIT> again.

As long as the operator is in edit mode, all keys not required for input are locked.

Figure 5

Overview		1/9	14:39	
No	Target	Actual	%	- +
01	175	180	14	■ A
02	180	180	17	
03	180	180	12	
04	180	180	15	
05	180	180	15	
06	180	180	17	
07	180	180	14	
08	180	180	17	
09	180	180	15	
10	180	180	18	
				1
Target value = 175				

**Function keys****3.1 Overview**

After switching on the MBS or pressing <OVERVIEW>, the overview mask will appear on the display (Figure 6). It is possible to display 10 zones per page in this overview mask. It is possible to page forwards and backwards using the cursor keys. The current page is displayed in the title (line 1). The number after the oblique (/) indicates the total number of pages. The required zones to be displayed on the individual pages can be set in **Service/Set-up** under **Service/Overview**. In the information field, the following are displayed from left to right: zone number, information regarding current special modes of the zone, target value, actual value, regulation ratio, target/performance deviation bar and, for limit value alarms, an "A" next to the corresponding zone.

Information for special function:

2S = 2nd target value  
St = actuator mode  
An = start-up operation  
Rp = ramp function  
HA = heating start-up adaptation  
KA = cooling start-up adaptation  
BA = operating point adaptation

By pressing <OVERVIEW> again, the regulation ratio, the actuator, the target/performance deviation bar and the "A" for possible alarms disappear from the screen and are replaced with a plain language display for each zone. 11 characters are available for this purpose (Figure 7). The texts can only be entered via a superordinate system, e.g. PC, and loaded from there into the MBS.

The displayed target values can be altered by pressing <INPUT/EDIT>.

For the target/performance deviation bar, a maximum of 13 LED bars for the + and - range are displayed in each case. The number of °C which is displayed per LED bar can be set in **SET-UP/SERVICE** under the menu point **SERVICE/OVERVIEW** (Chapter 5.1).

Figure 6

Overview		1/9	16:41	
No	Target	Actual	%	- +
01	180	180	14	
02	180	180	17	
03	180	185	12	■ A
04	180	180	15	
05	HA180	165	15	■ A
06	180	180	17	
07	180	180	14	
08	180	180	17	
09	180	180	15	
10	St180	180	18	■ A
				1-

Overview mask after switching on or by pressing the <OVERVIEW> key.

Figure 7

Overview		1/9	11:32	
No	Target	Actual	Designat.	
01	210	210	Zone	1
02	210	210	Zone	2
03	210	211	Zone	3
04	210	210	Zone	4
05	210	208	Zone	5
06	210	210	Zone	6
07	210	209	Zone	7
08	210	211	Zone	8
09	210	210	Zone	9
10	210	210	Zone	10
				1-

Overview mask after pressing the <OVERVIEW> key again.

### 3.2 Alarms

The function key <ALARM> is fitted with a red LED. If a new alarm is detected, the red LED will flash and the alarm contacts are actuated. The MBS 900 has 2 alarm relays, each with one changeover contact.

The 1st alarm relay is connected when there is an active alarm, and the 2nd alarm relay when a new alarm appears.

By pressing <ALARM>, the alarm message is acknowledged, and the alarm contact of alarm relay 2 for a new alarm is released. The red LED is continuously illuminated and the alarm overview for up to 60 zones is displayed on the screen (Figure 8). The zones in which an alarm is active are marked by an "A". Approach the required zone using the cursor field, and the alarm status is then displayed in the input line of the selected zone.

GW- = limit value, below

GW+ = limit value, above

I- = current alarm, heating off

I+ = current alarm, heating off

TCB = sensor rupture (TCB = thermo-cable break)

COM = communications error

A flashing A indicates a sensor rupture (TCB) or a communications error.

Figure 8

Alarm/overview											09:46
Zone	1	2	3	4	5	6	7	8	9	0	
01-10				A							
11-20		A						A			
21-30					A	A					
31-40											
41-50											
51-60											
											1
GW-											

By pressing <ALARM> again, the alarm list appears on the display (Figure 9). The title displays the first alarm on the page, followed by the total number of alarms after the oblique. The following are displayed in the information field from left to right: the zone number, the alarm type, the day of the week with the time the alarm began, and the day of the week with the time the alarm ended (if the alarm is no longer active). If more alarms are present than are displayed on the page, you can select the alarms page by page using the cursor controls. A maximum of 255 alarms are included in the alarm list. Each new alarm above 255 is included in the list, but with the result that the first deletable alarm in the alarm list is automatically deleted.

Delete alarm list:

It is only possible to delete individual or several alarm messages stored in the alarm list from code level 2 upwards.

Delete individual alarms:

To delete individual alarms, first switch to edit mode. Once the key <INPUT/EDIT> has been actuated, the selection to delete **INDIVIDUAL** or **ALL** alarms will appear in the input line (Figure 10). Select the alarm to be deleted using the up/down cursor keys, and press <ENTER>. Alarms which do not display an alarm termination time (active alarms) cannot be deleted. In the edit mode, the alarms to be deleted can only be approached page by page. To delete alarms which are not in the information field, it is necessary to exit the edit mode, and call up the relevant page using the cursor controls first.

Delete all alarms:

To delete individual alarms, first switch to edit mode. Once <INPUT/EDIT> has been actuated, the selection to delete **INDIVIDUAL** or **ALL** alarms will appear in the input line (Figure 10). Select **ALL** in the selection menu using the cursor keys and press <ENTER>. By acknowledging with <ENTER>, all deletable alarms, including those on other pages, are deleted.

Figure 9

Alarm/list 001/008 09:46			
Zone Type from Time ..to			
04	GW+	Di09:22	- - - - -
06	I+	Di09:25	- Di09:32
06	GW-	Di09:26	- Di09:45
12	GW-	Di09:26	- - - - -
17	GW-	Di09:28	- - - - -
25	GW-	Di09:28	- - - - -
26	GW-	Di09:30	- - - - -
01	GW+	Di09:34	- Di09:41
			1

Figure 10

Alarm/list 001/008 09:46			
Zone Type from.. Time..to			
04	GW+	Di09:22	- - - - -
06	I+	Di09:25	- Di09:32
06	GW-	Di09:26	- Di09:45
12	GW-	Di09:26	- - - - -
17	GW-	Di09:28	- - - - -
25	GW-	Di09:28	- - - - -
26	GW-	Di09:30	- - - - -
01	GW+	Di09:34	- Di09:41
			2
Individual All			

### 3.3 Zone/Loop menu

The zone-specific parameters are located at the program level **ZONE/LOOP**.

A list of all zone-relevant data (Figure 11) will appear in the information field of the display. The current physical zone number, the plain text relating to the zone and the time will appear in the title. By pressing the **up/down** cursor keys, the parameter list within the zone is paged upwards and downwards, page by page. By pressing **<INPUT/EDIT>**, the parameters can be selected line by line using the cursor controls, and the corresponding parameters altered in the input line. To view or change other zones, it is first necessary to exit the edit mode and select the required zone directly using the **left/right** cursor keys or by pressing **Zone/Loop** again.

#### Entering the zone no. directly:

By pressing **<ZONE/LOOP>** again, the cursor will flash on the 2-digit zone number in the first line (title). The zone to be selected is then entered directly via the numerical key pad and confirmed with **<ENTER>**. If a zone is entered whose number is larger than the maximum number of zones, the parameters of the 1st zone are displayed.

Figure 11

Zone 01 Parameter		10:05
Sow	Target value	180
Ist	Actual value	179.6
Stg	Regulation ratio	50
StB	Actuator mode	OFF
Gw-	Limit value -	005
Gw+	Limit value +	005
IwI	Actual current	009.1
DeI	Current tolerance	01.0
SoI	Target current	009.5
Iset	Current transfer	OFF
Sow2	Target value 2	120
		1

#### To alter parameters:

Actuate **<INPUT/EDIT>** and select the parameters to be altered using the **up/down** cursor keys. The corresponding current value is displayed in the input line. This can be overwritten, or deleted first by pressing **<C>** then re-entered; the value is accepted by pressing **<ENTER>**. If a parameter in the configuration (**SERVICE/ZONE**) is for display only but is not enabled for input at the displayed code level, it is approached in edit mode, but cannot be altered.

All parameters are listed and described in chapter 8

## Entering values in blocks for all existing zones

Block mode can only be activated at code level 3. Press and hold down <ENTER>, actuate <Edit/Input>, then release <Enter> and <Edit/Input>. The zone menu switches to block transfer of the altered values (Figure 12). This is indicated in the information field with the words **\*\* B l o c k   m o d e \*\***. Approach the parameter to be altered with the cursor. The current value is displayed in the input line (depending on the code level). This can be entered and transferred by pressing <ENTER>. After actuating <ENTER>, the altered value is sent to all existing zones. As a visible indicator, the activated zones appear one after another at the bottom left, above the input line. Block mode is exited by pressing <EDIT/INPUT>. This occurs automatically if no keys are actuated for approximately 2 minutes. If a parameter has been approached and altered by mistake, it is possible to prevent the altered value from being sent to all zones by pressing <EDIT/INPUT>. However, this is only possible if <ENTER> has not yet been pressed.

### Caution:

When using block mode, check first that the value should in fact be sent to all zones. Otherwise, zones which are not in used and are in OFF mode will also be actuated when activated in block mode.

Figure 12

Zone 01 Parameter		10:05
<b>** B l o c k - m o d e **</b>		
Sow	Target value	180
Ist	Actual value	179.6
Stg	Regulation ratio	50
StB	Actuator mode	OFF
Gw-	Limit value -	005
Gw+	Limit value +	005
IwI	Actual current	009.1
DeI	Current tolerance	01.0
SoI	Target current	009.5
Iset	Current transfer	OFF
Sow2	Target value 2	120
01		3
GW-	Limit value -	04

## Status display per zone:

By pressing <C> in the zone menu, a status display will appear on the screen for the selected zone (Figure 13). This indicates the current operating mode of the zone and the setting of the zone. You return to the zone parameter list by pressing <ENTER>.

Figure 13

Zone 01 Status	10:16
Zone : active Type: 2pt	
Sollw: 185.0 Istw: 184.5	
Hzg : ON Klg : OFF	
Alarm: passiveStat: contro	
Adapt:	
Exit with Enter	

### **3.4 Recipe / Product**

At the program level Recipe/Product, it is possible to save, load and pre-configure recipes, in other words, the parameter settings required for a given product.

The operation depends on the code level and can only be done, if code level one or higher is enabled.

Switch Code level one or higher, actuate <RECIPE/PRODUCT> and the menu point "Recipe management" will appear on the display (Figure 14). The number of recipes stored in the MBS (after the oblique), the memory space required in % and the current time are displayed in the title after Recipe Mem: . In the information field, from top to bottom, the number of the currently loaded recipe with the date and time it was created are displayed in the first line after Active: . A four-digit number combination is available for the recipe name. The code level under which the recipe was created is automatically displayed after the hyphen. The amount of memory space required for the recipe in %, the date of creation and the time are displayed after the recipe name. If the active recipe number is displayed inversely and flashing, this indicates that a parameter of the loaded recipe has been altered in the Zone/Loop menu.

The individual recipes are then listed in table form. Only code level 3 displays all stored recipes, including those with a lower code number. Code level 2 only displays those recipes created under code levels 1 + 2, and code level 1 only displays those recipes created under code level 1. However, the total number of recipes available appears in the title. The creation, saving and loading of recipes depends on the code level (see Chapter 5.3, Service/Zones). The amount of memory space required, the date and the time when the recipe was created are displayed after each recipe name. In the recipe store max. 6410 Bytes are available, for storage of all parameters of 8 zones ca. 395 Bytes are required.

Figure 14

Recipe Mem: 05/26 % 15:15				
Active: 3410 15/08 15:02				
Nr. Name		Created on		
01	5000-3	5,2%	13/08	11:16
02	6000-3	5,2%	13/08	11:16
03	3692-3	5,2%	13/08	15:10
04	4582-3	5,2%	13/08	15:11
05	0000-3	5,2%	13/08	15:19
				3-

If an alteration is implemented after saving a recipe in SET-UP/SERVICE (under ZONES), e.g. other parameters are enabled or locked, the alteration will have no influence on the previously saved recipe.

Function:

By pressing <INPUT/EDIT>, the first recipe is portrayed inversely in the information field, and the four menu points **LOAD**, **STORE**, **CLEAR** and **EDIT** appear in the input line (see Figure 15).

Figure 15

Recipe Mem: 06/26 % 15:15				
Active: 3410 15/08 15:02				
Nr.	Name	Created	on	
01	5000-3	5,2%	13/08	11:16
02	6000-3	5,2%	13/08	11:16
03	3692-3	5,2%	13/08	15:10
04	4582-3	5,2%	13/08	15:11
05	0000-3	5,2%	13/08	15:19
				3
LOAD STORE CLEAR EDIT				

LOAD (load recipe):

In order to load a recipe, first press <INPUT/EDIT>. A selection menu will then appear in the input line (see Figure 15). Select the recipe to be loaded using the up/down cursor keys and confirm with <ENTER>. After pressing <ENTER>, the dialog field Load recipe will appear (Figure 16). The recipe name of the recipe to be loaded will appear after the word **Name: .** The loading procedure is activated by pressing <ENTER>. After pressing <ENTER>, the zone number followed by the number of the parameters being loaded will appear beneath the line with the name of the recipe to be loaded. The loading procedure takes approximately 5 sec. per zone to transfer 35 parameters. Once the loading procedure is complete, the system automatically jumps back to the recipe menu. The control card will now operate with the settings saved in the recipe.

If an incorrect recipe has been selected and the loading process activated, it is possible to cancel the menu point Load recipe by pressing <C>. However, the values loaded prior to cancelling will be accepted as valid.

Figure 16

Recipe Mem: 06/32,4% 15:20			
Active 3410 15/08 15:02			
N	load recipe		
0	Name: 5000-3		
0			
0			
0			
0	C - cancel		
0	Enter - continue		
3			
LOAD STORE CLEAR EDIT			

## STORE (save recipe):

In order to save a recipe, enter the code level under which the recipe should be saved. By pressing <INPUT/EDIT>, the 4 menu points LOAD, STORE, CLEAR and EDIT are displayed in the input line. Select the menu point STORE using the left/right cursor keys and confirm with <ENTER>. After pressing <ENTER>, the dialog field "Save recipe" will appear. At this point, a four-digit numerical code is assigned to the recipe, and the storage procedure is activated by pressing <ENTER> (Figure 17). The available memory space is indicated at the bottom right of the dialog field. Once all parameters have been saved, the recipe overview will be displayed. The recipe which has just been created will be displayed as the last recipe in the list. If the Save recipe menu is selected by mistake, it is possible to exit this menu by actuating <INPUT/EDIT>.

## Memory space

The memory space required for a recipe depends to a large extent upon the number of parameters which are to be saved in a recipe. It is impossible to state precisely what percentage a parameter requires, since not all parameters require the same amount of memory.

Figure 17

Recipe Mem: 06/34,6% 15:20			
Active: 3410 15/08 15:02			
Save recipe			
0	Name:	0000	
0			
0			
0			
0			
0			
			65.4%
			3
LOAD STORE CLEAR EDIT			

If the amount of memory required is greater than the memory space available, an error message will appear in the information field (Figure 18). This error message will contain information concerning the memory space available, and the memory required for the recipe being created. The error message is exited by pressing <ENTER>, and you will then jump back to the recipe menu.

Figure 18

Recipe Mem: 09/36,4% 13:30			
Active 3410 15/08 15:02			
Recipe error			
0	Not enough memory		
0			
0	free memory	xxxxx	
0	Recipe size	xxxxx	
0			
0	Enter - continue		
3-			
LOAD STORE CLEAR EDIT			

**CLEAR (delete saved recipes):**

To delete recipes, enter the code level under which the recipe was saved.

Press <INPUT/EDIT>, and the menu strip with 4 options will be displayed. Using the left/right cursor keys, select the menu point CLEAR, then select the recipe to be deleted and confirm with <ENTER>.

A dialog field entitled **Delete recipe** will then appear (see Figure 19). The selected recipe name is again displayed in this dialog field for verification. Activate the deletion procedure with <ENTER>.

If an incorrect recipe has been selected by mistake, it is possible to exit the menu point **Delete recipe** by actuating <C>. Once the deletion procedure is complete, the system automatically exits the menu and returns to the recipe menu.

Figure 19

Recipe Mem: 06/36,4% 15:20			
Active 3410 15/08 15:02			
N	Delete recipe		
0	Name: 5000-3		
0			
0			
0	C	- cancel	
0	Enter	- continue	
0			
07 9562-3 12% 23/08 15:27			
3-			
LOAD STORE CLEAR EDIT			

## EDIT (change):

In the recipe management facility, it is possible to subsequently alter saved recipes. In order to edit recipes, you must enter the code level under which the recipe was saved.

Actuate <INPUT/EDIT> and the menu strip with 4 options will be displayed. Using the left/right cursor keys, select the menu point EDIT and select the required recipe using the up/down cursor keys, then confirm with <ENTER>.

A dialog field entitled Edit recipe will appear (Figure 20). The recipe name is displayed again in this dialog field for verification. It is possible to cancel the editing process with <C>, or activate it with <ENTER>.

After pressing <ENTER>, the zone number and the parameters per zone which are saved in the recipe (Figure 20) are listed. The number of parameters depends upon which parameters were enabled for saving in SERVICE/SET-UP under SERVICE/ZONE.

Figure 20

Recipe Mem: 06/61,6% 15:20			
Active 6730 15/08 15:02			
N	Edit recipe		
0	Name:	5000-3	
0			
0	C	- cancel	
0	Enter	- continue	
0			
07 9562-3 8,2% 23/08 15:27			
3			
LOAD STORE CLEAR EDIT			

Parameters can be altered in the Input/Edit mode. After terminating the entry, press the <RECIPE/PRODUCT> function key in order to exit the EDIT menu. The altered parameters are automatically stored under the same recipe name.

Figure 21

Zone 01 Recipe editor10:05			<Recipe name
0000			
Sow	Target value	180	
Stg	Regulation ratio	14	
StB	Actuator mode	OFF	
Gw-	Limit value -	04	
Gw+	Limit value +	04	
DeI	Currenttolerance	01.0	
SoI	Target current	12.4	
Iset	Current transfer	OFF	
Sow2	Target value 2	120	
XpH	Prop.band	1.2	
TdH	Diff.time	016	
			1

### 3.5 Service/set-up

By selecting <SERVICE/SET-UP>, you enter the configuration level with which the MBS 900 and the connected periphery cards are freely configured. However, you can only enter this operating level by entering code level 3 (six-digit numerical code no.) (Figure 22).

A detailed description of the SERVICE/SET-UP operating level can be found in Chapter 5.

Figure 22

Service	10:28
Overview	
Cards	
Zones	
Zone allocation	
Alarm	
Interface	
Code	
Date/time	
Time switch	
Diagnosis	
Language	
3	
Select with the ENTER-Key	

#### **4. Functions**

##### **4.0 Display contrast setting:**

The display contrast is set in code level 1. In order to change the intensity, hold down the <SET-UP/SERVICE> function key and set the required intensity with the cursor controls (arrow upwards/downwards). The set contrast is saved automatically once the function key <SET-UP/SERVICE> is released.

##### **4.1 Sensor selection:**

Four different sensor types are available - FeCu-J, FeCu-L, NiCr-K and Pt 100. When using Pt 100 sensors, a special periphery card is required (because the input wiring deviates from the temperature sensors). Input is implemented in the Service/Set-up menu under Service/Cards (see 5.2). Input is card-specific, so that only one sensor type can be selected for each card.

Select code level 3 with <A> and confirm, activate <SERVICE/SET-UP> and select the menu point SERVICE/CARDS using the up/down cursor keys. The MBS 900 checks the card addresses at which a card is located. Free slots are marked inversely and flashing.

Press <INPUT/EDIT> and select the sensor type to be altered in the Sensor column using the left/right and up/down cursor keys. You switch to another sensor type by actuating a numerical key (0-9) and confirm it with <ENTER>. The input function is terminated by pressing <INPUT/EDIT>.

##### **Sensor types**

The difference between the temperature sensors FeCu-J and FeCu-L consists of the fact that the temperature sensors issue slightly different thermo-electromotive forces, for example, at 200°C, the FeCu-J supplies a thermoelectric e.m.f of 10.777 mV, and the FeCu-L a thermoelectric e.m.f of 9.20 mV.

If you require a very precise control system, please observe these differences and enquire which sensor type you have connected.

#### **4.2 Configuration of zones (2-point/3-point zones)**

Configuration of the zones is implemented in the **SERVICE/SET-UP** menu under the selection point **CARDS** (see Chapter 5.2). 5 configurations are available

8 x heating  
7 x heating 1 x cooling  
6 x heating 2 x cooling  
5 x heating 3 x cooling  
4 x heating 4 x cooling

Select code level 3 using **<A>** and confirm, then actuate **<SERVICE/SET-UP>** and select the menu point **SERVICE/CARDS** using the up/down cursor keys. The MBS 900 then checks the card addresses at which a card is located. Free slots are portrayed inversely and flashing.

Press **<INPUT/EDIT>** and select the corresponding periphery card in the **Cfg** column using the left/right and up/down cursor keys. By actuating a numerical key (0-9), the system switches to another output circuit and must be confirmed with **<ENTER>**. The input function is terminated by pressing **<INPUT/EDIT>**.

#### **4.3 Start-up circuit with regulation ratio ramp**

The MBS 900 has a freely adjustable start-up circuit with ramp function. This ensures that the heating cartridge is not set in operation immediately at 100% heating capacity, but instead, the heating is slowly brought to start-up temperature. The start-up circuit does not become active until an actual value of  $< 100\text{ }^{\circ}\text{C}$  and a target value of  $> 100\text{ }^{\circ}\text{C}$  has been detected after switching on the control system. When it detects that the start-up function is present, the start-up time begins to elapse.

The value entered as regulation ratio ramp ( $R_p$ ) (in %/min) means that the control increases the regulation ratio limit by this value each minute, e.g. 10%/min, 20%/min until the start-up temperature of  $100^{\circ}\text{C}$  has been reached. However, the regulation ratio is not increased by the entered value, but always in increments. See example 1. The start-up circuit with regulation ratio ramp is card-specific. Input of the start-up time with regulation ratio ramp is implemented in **SERVICE/SET-UP** under the menu point **SERVICE/CARDS**. See Chapter 5.2.

Select code level 3 via **<A>** and confirm, actuate **<SERVICE/SET-UP>** and select the menu point **SERVICE/CARDS** using the up/down cursor keys. The MBS 900 now checks the addresses at which a card is located. Free slots are portrayed inversely and flashing.

Press **<INPUT/EDIT>** and select the corresponding periphery card in the **Az** or **Rp** column using the left/right or up/down cursor keys. Enter the start-up time under **Az** and the regulation ratio ramp under **Rp** using the numerical key pad (0-9). Each entry must be confirmed with **<ENTER>**. The input function is terminated by pressing **<INPUT/EDIT>**.

Activation of the start-up circuit per zone is implemented in the **ZONE/LOOP** menu under the parameter **Anf = start-up** (ON or OFF). To indicate that the zone is in start-up mode, the abbreviation **An** for start-up, and simultaneously the start-up temperature and alternately **Rp** for ramp function, are flashed up cyclically in the **OVERVIEW MASK** before the target value.

##### **Example 1:**

With a set ramp regulation ratio of 10%, the regulation ratio limit of the connected zone is increased by 1% every 6 seconds, starting from 0%. This continues until the  $100^{\circ}\text{C}$  start-up temperature has been reached. As soon as the  $100^{\circ}\text{C}$  start-up temperature has been reached, the regulation ratio ramp function is disactivated. The zone

is then settled at 100°C, depending on the set-up time available, and returns to the set target lowering/2nd target value once the start-up time has elapsed.

Regulation ratio ramp = 10%

$$\begin{array}{rcl} \text{Pulse time} & = & 1\% \times 60 \text{ sec} \\ & & \text{-----} \\ & & 10 \text{ sec} \end{array} = 6 \text{ sec}$$

#### **4.4 Actuator mode:**

Three types of actuator mode are available:

1. Manual actuator mode without preceding regulation
2. Manual actuator mode with temperature regulation after sensor rupture
3. Automatic actuator mode with regulation after sensor rupture

Activation of the actuator mode for each zone is implemented in the zone/loop menu under the parameter Stb - actuator mode. To show that the zone is in actuator mode, St for actuator mode is flashed up cyclically in the overview mask, in front of the relevant target value.

##### 1. Actuator mode

In order to activate actuator mode, the parameters StB - actuator mode and zone operating status (in the ZONE/LOOP menu) must be set to ON. Actuate <Zone/Loop>, and select the required zone using the left/right cursor controls or via direct input. Press <Edit/Input> and select the parameter Stb - actuator mode using the up/down cursor controls, switch actuator mode from OFF to ON in the input line by pressing a numerical key (0 to 9), and acknowledge with <ENTER>. The selected zone is now in actuator operator, irrespective of whether a sensor is connected or not. However, care should be taken to ensure that the parameter zone operating status is set to ON (zone active). Exit the Zone/Loop menu by pressing <Overview>. In order to indicate that the zone is in actuator mode, "St" is flashed up cyclically in front of the target value. The required regulation ratio with which the zone should be operated is entered in the same manner as the target temperature value, by pressing <Edit/Input> and zone selection using the up/down cursor controls; the regulation ratio is displayed in the input line for alteration. When using the cooling output, it is necessary to switch to Cool before entering the regulation ratio. This is implemented by pressing the decimal point key. For identification purposes, a minus symbol (-) is inserted in the input line to the left of the value to be entered.

## 2. Manual actuator mode after sensor rupture

If there is a sensor rupture during normal control operation, it is possible to continue operation with the value determined so far in the parameter Stg - regulation ratio by activating the parameter StB - actuator mode. However, with three-point controlled systems, care should be taken to ensure that the system continues to function with the regulation ratio in whose operating status the control was prior to rupture of the sensor, in other words, if the controlled system was in heating mode, the system continues with the determined regulation ratio for heating, and if it was in cooling mode, it continues with the regulation ratio for cooling (identified by a minus symbol).

## 3. Automatic actuator mode after sensor rupture

It is possible to program automatic actuator mode during operation in the event of a sensor rupture. For this purpose, the parameter A-Stb - actuator mode in the ZONE/LOOP menu should be switched to ON. If the parameter A-Stb - automatic actuator mode is activated, the system automatically switches to actuator mode if a sensor rupture is detected (as an indicator of this, the actual value display changes to 999°C) and continues operation with the regulation ratio determined up to that point (parameter Stg). With three-point controlled systems, this may be the actuator mode for heating or actuator mode for cooling, depending on the operating status of the controlled system prior to the sensor rupture.

### Caution:

Automatic actuator mode has the advantage that production can continue without losing time. However, when activating this parameter, the following should be noted: if sensor rupture occurs in the most unfavourable case during the heat-up phase, the system will continue operation with a regulation ratio of 100%. For this reason, an optical or acoustic alarm system should be connected separately in all cases.

#### 4.5 Current monitoring

Via the appropriate peripherals, such as current transformer and a current transformer card STI 88, it is possible to implement current monitoring of the connected heating circuits. The parameters **IwI** - actual current, **DeI** - current tolerance, **SoI** - target current and **Iset** - current transfer are located in the **ZONE/LOOP** menu. In the parameter **IwI** - actual current the measured actual current is displayed in amperes with a decimal pint. With the parameter **DeI** - current tolerance, the current tolerance by which the actual current may fluctuate without initiating an alarm message is set. This value should be at least 10% of the target current. With the parameter **SoI** - target current, the target current is entered; if the target current is not known, it is possible to adopt the actual current as the target current via the parameter **Iset** - current transfer.

##### Current transfer:

Actuate **<ZONE/LOOP>**, and the parameters valid for the first zone at this operator level will be listed. If necessary, other zones can be selected by using the left/right cursor controls or via direct input. Actuate **<INPUT/EDIT>** and select the parameter **Iset** - current transfer using the up/down cursor keys. By pressing a numerical key, the display in the input line switches from **OFF** to **ON** and must be confirmed with **<ENTER>**. After activating the current transfer, the heating is switched on for 20 msec. After transferring the measured actual current as the target current, the parameter **Iset** - current transfer is automatically switched from **ON** to **OFF**. After entering the target current, the current tolerance must be adjusted to the target current under the parameter **DeI** - current tolerance. This value should be at least 10% of the target current.

The alarm message **CURRENT ALARM** is activated if the current tolerance exceeds or undercuts the current tolerance with the heating switched on. It is also activated if a current is flowing with the heating switched off. This could occur if a contactor is sticking or a solid-state relay is defective.

#### **4.6 Adaptations**

The temperature periphery card (ETR 94 E) connected to the MBS 900 has an automatic parameter calculation facility (ADAPTATION) of the connected temperature zones for 2-point and 3-point controlled systems. The adaptations are activated in the ZONE/LOOP menu. Two types of adaptation are available:

1. Start-up adaptation for heating and cooling at a temperature difference of  $> 40^{\circ}\text{C}$  of the actual value for heating and  $< 30^{\circ}\text{C}$  for cooling.
2. Operating point adaptation calculates the zones around the set target value.

**Caution:**

It is important to note the following: before a start-up adaptation is triggered, the actuator and/or controlled system must be connected and functioning, otherwise, the parameters will be incorrectly calculated.

Adaptation of the controlled system must be implemented for each commissioning, in the event of replacement of the control card ETR 94 E (if the control-specific parameters have not been stored in a recipe), and in the event of a change in the controlled system, i.e. greater or less heating or cooling.

To indicate that the zone is in adaptation mode, the following is cyclically flashed up in front of the relevant target value in the overview mask:

HA- for heating adaptation

KA- for cooling adaptation and

BA for operating point adaptation.

#### **Ada - adaptation**

Actuate <ZONE/LOOP>, and select the required zone using the left/right cursor controls or via direct input. Press <INPUT/EDIT> and select the parameter Ada - adaptation using the up/down cursor controls. Set the adaptation from OFF to ON in the input line using the numerical key pad, and confirm with <ENTER>. After pressing ENTER, the adaptation target value will appear in the display of the dialog field (see Figure 23). The currently set target value is displayed in this dialog field, and can be accepted by pressing <Enter> or re-defined.

Figure 23

Zone 01 Parameter		10:05
Ada	Adaption	ON
Rampe	temp.increase	000.0
Adaption target value		
Target value: 122		
Enter - accept		
A-Kpa	cooler adaption	OFF
A-Stp	actuator mode	OFF
		1
Ada	adaption	ON

Method of functioning:

1. If the displayed target value is accepted with **<Enter>**, or the entered target value for 2-point controlled systems is not  $> 39^{\circ}\text{C}$  than the current actual value, after pressing **<Enter>**, an operating point adaptation for heating will be implemented.
2. If the displayed target value is accepted with **<Enter>**, or the entered target value for 3-point controlled system is not  $> 39^{\circ}\text{C}$  or not  $< 29^{\circ}\text{C}$  than the current actual value, by pressing **<Enter>**, an operating point adaptation will be implemented simultaneously for heating and cooling.
3. If the entered target value is set at  $> 40^{\circ}\text{C}$  than the actual value and acknowledged with **<ENTER>**, a start-up adaptation for heating will be implemented for 2-point and 3-point controlled systems.
4. If the specified target value is set at  $< 30^{\circ}\text{C}$  of the actual value, upon acknowledging with **<ENTER>**, a start-up adaptation for cooling will be implemented for 3-point controlled systems.

In general, zone calculation with the start-up adaptation produces a more precise calculation of the controlled system. In general, calculation of the controlled system using an operating point adaptation should only be implemented if calculation with the start-up operation is inadequate due to excessive interference factors during operation.

If the parameters "Autom. heating and cooling adaptation" are activated, if a target value of  $> 40^{\circ}\text{C}$  than the current actual value is detected, first a heating adaptation and then a cooling adaptation will be implemented.

The adaptations are switched to passive as soon as a ramp function is activated (regulation ratio ramp or temperature ramp).

#### **4.7 Second target value/lowering**

The connected temperature control card ETR 94 E has the option of activating a 2nd target value or a lowering. The second target value or lowering is triggered via a floating contact via the BUS terminal strip (rack RV 94) 3 and 8.

##### **2nd target value**

The 2nd target value is set in the **ZONE/LOOP** menu:

Actuate <Zone/Loop>, and select the required zone using the left/right cursor controls or via direct input. Press <INPUT/EDIT> and using the up/down cursor controls, select the parameters **Sow2 - Targ. val. 2/lower** and **Sw2F - 2nd targ. val./lower**. The value for the 2nd target value is entered under the parameter **Sow2 - Targ. val. 2/lower**. The second target value must be selected under the parameter **Sw2F - 2nd targ. val./lower**. If the connected floating contact is actuated, the entered 2nd target value is activated. To indicate this, "2S" is flashed up cyclically in the overview mask in front of the target value (2nd target value).

The 2nd target value is always activated card by card, i.e. all control zones used are activated. However, if you only wish to activate certain zones of a control card, for all zones which are not to be activated, you should set the parameters **Sow2 - Targ. val. 2/lower** and **Sw2F - 2nd targ. val./lower** to **LOWER**. This means that instead of a 2nd target value, a lowering has now been activated. However, as the lowering temperature is set at 0°C, no alteration to the target value is implemented and the previously set target value remains current. The information that the 2nd target value has been activated is still flashed up on the screen.

##### **Lowering:**

Press <Zone/Loop>, and select the required zone via the left/right cursor controls or via direct input. Press <INPUT/EDIT> and using the up/down cursor controls, select the parameters **Sow2 - Targ. val. 2/lower** and **Sw2F - 2nd targ. val./lower**. Under the parameter **Sow2 - Targ. val. 2/lower**, the lowering value (differential value) is entered. Under the parameter **Sw2F - 2nd targ. val./lower**, the lowering function must be selected. If the connected floating contact is actuated, the lowering function is activated, and the prescribed target value is reduced by the lowering factor. To indicate this, "2S" is flashed up cyclically in the overview mask in front of the target value (2nd target value).

**4.8 Temperature ramp**

The temperature ramp is zone-specific and is set in the **ZONE/LOOP** menu under the parameter **Ramp - temp. increase**. With the temperature ramp, it is possible to prevent the heating from overheating too severely in zones in which the sensor is too far away from the heating; it also achieves even heating of the controlled systems.

The value is entered in °C per minute, in other words, if a temperature ramp of, say, 10°C per minute is set, the set target value will be increased by 1°C every 6 seconds, starting from the current actual value, until the set target value is reached. Setting the value used is zone-specific and must be set separately for each zone.

In order to show that the zone is in ramp mode, **Rp** for ramp mode and the current ramp target value are displayed cyclically in the overview mask.

Upon activating the temperature ramp function, the start-up adaptation for heating and cooling is automatically deactivated. In order to guarantee correct functioning of the temperature ramp, the connected controller should calculate the control zones in advance. This is implemented with adaptation (self-optimisation, see Chapter 4.6).

**Entering the temperature ramp:**

The temperature ramp is entered in the **ZONE/LOOP** menu. Actuate **<ZONE/LOOP>** and select the required zone using the left/right cursor controls or via direct input. Press **<INPUT/EDIT>** and select the parameter **Ramp - temp. increase** using the up/down cursor controls. The parameter and the currently set value are displayed in the input line. At this point, the required temperature increase per minute for the zone is prescribed using the numerical key pad. Afterwards, confirm the entry with **<ENTER>**.

If the target value matches the actual value, the temperature ramp is not activated. The temperature ramp does not become active until another target value is entered.

#### **4.9 Target value minimum and maximum**

The MBS 900 has the option of limiting the target value input in the **overview mask** using the parameters **Target value min.** and **Target value max.** Input is implemented in the **ZONE/LOOP** menu under the parameters **SoMin - Target value min.** and **SoMax - Target value max.** Upon delivery of the MBS 900, the parameter **target value min.** is pre-set to 000°C and **target value max.** to 450°C, enabling a target value of between 0°C and 450°C for each zone.

##### **Altering the target value limits**

Actuate **<ZONE/LOOP>** and select the required zone using the left/right cursor controls or via direct input. Press **<Input/Edit>** and using the up/down cursor controls, select the parameters **SoMin - Target value min.** and **SoMax - Target value max.** The approached parameter and the currently set value for this are displayed in the input line. At this point, you may enter the required value in °C and confirm it with **<ENTER>**.

#### **4.10 Limiting the regulation ratio**

The parameters StMH - regulation ratio max., heating and StmK - regulation ratio max., cooling are located in the ZONE/LOOP menu and serve to limit the regulation ratio for heating and cooling. By entering a lower regulation ratio value for heating than for cooling, you can make overdimensioned heating sections and excessively aggressive cooling sections (water cooling) artificially slower and thus easier to control. With standard two-point and three-point controlled systems, the parameters for heating and cooling must be set to 99°. Alteration of the parameters must be implemented prior to an adaptation (controlled system calculation) (see Chapter 4.6).

##### **Altering the regulation ratio limits:**

Actuate <ZONE/LOOP> and select the required zone using the left/right cursor controls or via direct input. Press <Input/Edit> and using the up/down cursor controls, select the parameters StMH - regulation ratio max., heating and StmK - regulation ratio max., cooling. Under the parameter StMH - regulation ratio max., heating, the maximum regulation ratio for heating is entered in the input line using the numerical key pad (0-9), and under StmK - regulation ratio max., cooling, the maximum regulation ratio for cooling. The entry is then confirmed with <ENTER>.

---

**4.11 Selecting an actuator (disconnecter or contactors)**

Selection of the actuator for the heating and cooling outputs is implemented in the ZONE/LOOP menu. The parameters Rel-H - relay output, heating and Rel-K - relay output, cooling are available for this purpose. When using solid state relays or triacs for heating and cooling, the corresponding parameter must be set to OFF. If contactors are used as actuators instead of solid state relays or triacs, the corresponding parameter must be activated (set to ON). Activation prevents the contactors from being triggered with a maximum pulse frequency of 50 Hz (20 ms). In all cases, setting must be implemented prior to calculation (adaptation).

Actuate <ZONE/LOOP> and select the required zone using the left/right cursor controls or via direct input. Press <Input/Edit> and select the parameters Rel-H - relay output, heating and Rel-K - relay output, cooling using the up/down cursor controls. The actuator selection for the heating output is implemented under the parameter Rel-H - relay output, heating, and the actuator selection for the cooling output under Rel-K - relay output, cooling. Switching a parameter from ON to OFF and vice versa is implemented by pressing a numerical key (0-9) and must be confirmed with <ENTER>.

#### **4.12 Cooling linearisation (for water cooling)**

The function cooling linearisation under the parameter KLin - Cooling linear is located in the ZONE/LOOP menu and serves to linearise the cooling system. This means that when water cooling is used, the relationship between regulation ratio and temperature change (with a small regulation ratio) is not linear. When activated (set to ON), this deficiency is compensated by the software. When using standard cooling systems, the parameter must always be set to OFF.

Actuate <ZONE/LOOP> and select the required zone using the left/right cursor controls or via direct input. Press <Input/Edit> and select the parameter KLin - Cooling linear using the up/down cursor controls. The parameter is switched from ON to OFF and vice versa by pressing a numerical key (0-9) and must be confirmed with <ENTER>.

**4.13 Switch zone ON/OFF**

Zones are switched on and off in the **ZONE/LOOP** menu using the parameter **Zone operating status**. If the parameter **Zone operating status** is switched to **OFF**, the outputs for the zone in question are switched to passive, and there is no alarm output.

Actuate **<ZONE/LOOP>**, and select the required zone using the left/right cursor controls or via direct input. Press **<Input/Edit>** and select the parameter **Zone - operating status** using the up/down cursor controls. The parameter is switched from **ON** to **OFF** and vice versa by pressing a numerical key (0-9) and must be confirmed with **<ENTER>**.

**5. Configuration (SERVICE/SET-UP)**

The **SERVICE/SET-UP** menu is the configuration level at which the MBS 900 and connected periphery cards are configured.

The **SERVICE/SET-UP** menu can only be activated under code level 3.

**5.1 Overview**

The menu point **overview** serves to set the **OVERVIEW MASK**. This sets which zone is to be displayed on which page, at which code level the target value can be altered, whether the actual value is portrayed with or without a decimal point, and the resolution of the deviation bar.

**Zone:** This displays the zone number. The display depends on the assignment determined in the **Service/Zones** menu. For further details, please refer to Chapter 5.4.

This display cannot be altered, since it is determined in the **Zone allocation** menu.

**SW:** SW indicates **Target value**, and at this point, you enter the code level (1/2/3) under which the target value can be altered in the **OVERVIEW MASK**. The standard setting is code level 1.

**IW:** IW indicates **Actual value**. In this column, you determine whether the actual value is displayed in the **OVERVIEW MASK** as an integer = I (without decimal point) or as a real number = R (with decimal point). You switch the setting by actuating one of the numerical keys.

**xIx:** This column is used to set the resolution of the deviation bar. Resolution is in 1/10°C per LED bar, from 0.1°C to 9.9°C per LED bar. 13 LED bars are available for the deviation bar for temperature overshooting (+) and 13 LED bars for temperature undercutting (-).

**Example:**

At a setting of 10, the 10/10°C = 1°C per LED bar. This means that with a temperature deviation of 4°C, 4 LED bars are illuminated.

**Page:** This column sets the page on which the zone is to be displayed. A maximum of 9 pages are available, whereby up to 10 zones can be portrayed simultaneously on each individual page. If no display is required or desired (e.g. for zones which are not yet required), entering 0 prevents the zone from being displayed.

**Changing the overview mask settings:**

The overview mask settings are altered in the **SERVICE/SET-UP** menu under the menu point **Service/Overview**. Using the up/down cursor controls, select the **<Service/Overview>** menu and confirm with **<Enter>** (Figure 22). Actuate **<Edit/Input>**, select the required line or column using the left/right and up/down cursor keys, implement alterations, and confirm with **<Enter>**. After pressing **<Enter>**, the cursor will jump forwards one column. The input is terminated by pressing **<Edit/Input>**.

Figure 24

Service/Overview					10:22
Zone	SW	IW	XIX	Page	
01	1	I	10	1	
02	1	I	10	1	
03	1	I	10	1	
04	1	I	10	1	
05	1	I	10	1	
06	1	I	10	1	
07	1	I	10	1	
08	1	I	10	1	
09	1	I	10	2	
10	1	I	10	2	
11	1	I	10	2	
					3

**5.2 SERVICE/CARDS**

The menu point **SERVICE/CARDS** is used to configure the connected periphery cards and at the same time, to enter the start-up time and regulation ratio ramp.

The designations **Sensor**, **Cfg**, **T**, **Az** and **Rp** are explained in detail in other chapters.

<b>Sensor</b>	in Chapter 4.1
<b>Cfg</b>	in Chapter 4.2
<b>Az</b>	in Chapter 4.3
<b>Rp</b>	in Chapter 4.3

After calling up, the program checks the interface connection to the connected periphery cards. Periphery cards which are not connected and cards in which a communications error exists are displayed inversely in the **Adr** column.

In the information field, the hardware interface addresses of the connected periphery cards are displayed from left to right in the **Adr** (address) column. In the **Type** column, the type of connected periphery card is displayed or set. In the **Sensor** column, the type of connected sensor is displayed or set. In the **Cfg** (configuration) column, the 2-point or 3-point controlled system is displayed or set. In the **T** (temperature unit) column the physical unit for actual and target value is displayed or set. In the **Az** (start-up time) column, the start-up time in minutes is displayed or set (max. 99 minutes). In the **Rp** (ramp) column the regulation ratio ramp in % is displayed or entered (max. 99%).

**To change the setting:**

Using the up/down cursor controls, select the **<Service/Cards>** menu and confirm with **<Enter>** (Figure 25). Actuate **<Edit/Input>**, select the required line or column using the left/right and up/down cursor controls, implement the alterations, and confirm with **<Enter>**. After pressing **<Enter>**, the cursor jumps forward one column. The entry is terminated by pressing **<Edit/Input>**.

Input of Type, Sensor, Cfg and T is permanently installed in the program in table form, i.e. setting is switched by simply pressing numerical key.

Figure

Service/Cards		10:42					
Adr	Typ	Sensor	Cfg	T	Az	Rp	
0	94E	FeCuNi	8H	C	00	00	
1	94E	FeCuNi	8H	C	00	00	
2	94E	FeCuNi	4HK	C	00	00	
3	----	FeCuNi	8H	C	00	00	
4	----	FeCuNi	8H	C	00	00	
5	----	FeCuNi	8H	C	00	00	
6	----	FeCuNi	8H	C	00	00	
7	----	FeCuNi	8H	C	00	00	
							3

After setting or checking the displayed values, they are transmitted to the connected periphery cards after terminating the Card menu. If an incorrect periphery card type is entered on an address, or a periphery card type is entered on an interface address which is not defined in hardware terms, an error message for the corresponding interface address will appear on the display (Figure 26).

Figure

Service/Cards		10:47
Ad	Transmission Error	P
0		0
1		0
2	to control card 4	0
3		0
4	C - cancel	0
5	Enter - repeat	0
6		0
7		0
		3

Key <C> = cancel

By pressing <C>, the Service/Cards menu is cancelled, and the menu strip of SERVICE/SET-UP will appear.

Key <ENTER> = repeat

By actuating the <ENTER> key, the interface is checked again.

After activating the **Cards menu** or at any other time when the user is in the **Cards menu**, it is possible to call up the card configuration by pressing the **<C>** key (Figure 27). After calling up the card configuration, the MBS scans all connected periphery cards via the interface and displays their current configuration. At the same time, the interface is checked. You return to the **Cards menu** by pressing **<ENTER>**.

Figure

Service/Cards							10:55
** Card configuration **							
Adr	Typ	Sensor	Cfg	T	Az	Rp	
0	94EV7.	FeCu	8H	C	00	00	
1	94EV7.	FeCu	8H	C	00	00	
2	94EV7.	FeCu	8H	C	00	00	
3	----						
4	----						
5	----						
6	----						
7	----						
Press Enter to exit							

Az in min  
Rp in %

5.3 Service/Zones

In the SERVICE/ZONES menu, you determine which of the existing parameters are saved or not saved in the recipe menu and are masked, displayed or editable in the ZONE/LOOP menu. The code, recipe 1-2-3 and display 1-2-3 are displayed from left to right in the information field. In the first column beneath the title "Code", all existing parameters are listed in abbreviated form. The column "Recipe 1-2-3" corresponds to the code level 1-2-3, and at this point you determine which parameters can be saved or not under which code level. This determination applies to the recipe menu as described under Chapter 3.4. The column "Display 1-2-3" corresponds to code levels 1-2-3, and at this point, you determine which parameters are masked, visible only or visible and editable under which code level for the Zone/Loop menu. Input is implemented in Edit mode.

To change the setting:

Using the up/down cursor controls, select the <Service/Zones> menu and confirm with <Enter> (Figure 28). Actuate <Edit/Input>, select the required line or column using the left/right and up/down cursor controls, implement the alterations, and confirm with <Enter>. Input is implemented by pressing one of the numerical keys (0-9). The setting will then change from "-" to "+" or to "E", depending on what was set before. After pressing <Enter>, the cursor jumps one column forwards. The entry is terminated by pressing <Edit/Input>.

Recipe	Display
1-2-3	1-2-3
- = not saved	- = do not display
+ = may be saved	* = display, cannot be altered
	E = display, may be altered

Figure

Service/Zones				11:15		
Code	Recipe			Display		
	1	2	3	1	2	3
Sow	+	+	+	E	E	E
Ist	-	+	+	+	+	+
Stg	+	+	+	+	E	E
StB	+	+	+	+	E	E
Gw-	+	+	+	-	+	E
Gw+	+	+	+	+	E	E
IwI	-	-	+	-	-	E
DeI	+	+	+	-	+	E
SoI	-	-	+	-	-	E
				3		

## 5.4 Service / Zone allocation

The menu point Zone allocation is for both physical allocation of the zone number and for determining the order in which the zones are displayed in the overview mask (as a ranking distributor).

In the information field, the interface addresses of the connected peripheral cards will appear on the left beneath the Adr (address) column. The zone number (max. 8 zones) is displayed or entered in the relevant line next to it. Input is implemented in Edit mode.

To change the setting:

Select the <Service/Zone allocation> menu using the up/down cursor controls and confirm with <Enter> (Figure 29). Actuate <Edit/Input>, select the required line or column using the left/right and up/down cursor controls, implement the alterations, and confirm with <Enter>. Input is conducted via the numerical key pad (0-9). After pressing <Enter>, the cursor jumps one column forwards. Entry is terminated by pressing <Edit/Input>.

Figure

Service/Zones										11:21
Adr	* Zone allocation*									
0	01	02	03	04	05	06	07	08		
1	07	10	11	12	13	14	15	16		
2	17	18	19	20	21	22	23	24		
3	25	26	27	28	29	30	31	32		
4	33	34	35	36	00	00	00	00		
										3

With the ETR 94 E as a three-point control version (max. 4 zones) the zones which are not required as a pure temperature display should be set to 00.

Examples:

Adr	* Zone allocation *	
		(7 heating, 1 cooling)
		(6 heating, 2 cooling)
		(5 heating, 3 cooling)
		(4 heating, 4 cooling)

### 5.5 Service / Alarm

The menu point **Alarm** serves to configure the possible alarm messages and their display and storage in the alarm list, as well as activation of the **two floating relay contacts** present in the MBS. The function of the alarm relays are described in Chapter 7.

The following are enabled or locked in the information field, from left to right:

- Zone no.
- Gw+ = limit value alarm, above
- GW- = limit value alarm, below
- I+ = current alarm for heating on
- I- = current alarm for heating off
- TCB = alarm for sensor rupture
- Com = alarm for communications error and
- R = alarm relay output

Figure

Service/Alarm								11:24
Nr	GW+	GW-	I+	I-	TCB	COM	R	
01	J	J	J	J	J	J	J	
02	J	J	J	J	J	J	J	
03	J	J	J	J	J	J	J	
04	J	J	J	J	J	J	J	
05	J	J	J	J	J	J	J	
06	J	J	J	J	J	J	J	
07	J	J	J	J	J	J	J	
08	J	J	J	J	J	J	J	
09	J	J	J	J	J	J	J	
10	J	J	J	J	J	J	J	
11	J	J	J	J	J	J	J	
								3

#### To change the setting:

Using the up/down cursor controls, select the **<Service/Alarm>** menu and confirm with **<Enter>** (Figure 30). Actuate **<Edit/Input>**, select the required line or column using the left/right or up/down cursor controls, implement the alterations and confirm with **<Enter>**. Switching is implemented by pressing a numerical key (0-9). The setting then switches from "Y" to "N" and vice versa, depending on what was previously set. The entry is terminated by pressing **<Edit/Input>**.

## 5.6 Service / Interface

The menu point **Interface** serves to configure the host and head interface as well as setting the transmission rate from the MBS 900 to the periphery cards.

The baud rate can be selected between 1200, 2400, 4800, 9600 and 19200. For operation with the PSG II master program, 2 stop bits and no parity bit are required. The address is set to 00 as standard.

Transmission from the MBS 900 to the connected periphery cards is implemented at a baud rate of 9600. This input must be entered after the line **Baud control cards**:

Under **Scan repetition** it is possible to enter the number of times the MBS 900 should scan the connected controllers until an error message is output.

Figure

Interface configuration		
	Host	Head
Protocol :	PSG-II	PSG II
Baud rate:	19200	9600
Stop bit :	2	2
Parity :	----	----
Address :	00	00
Baud-Control cards :	9600	
Scan repetition	: 0	
3		

### To change the setting:

Using the up/down cursor controls, select the **<Service/Interface>** menu and confirm with **<Enter>** (Figure 31). Actuate **<Edit/Input>**, select the required line or column using the left/right or up/down cursor controls, implement the alterations and confirm with **<Enter>**. Protocol, baud rate and parity are switched by pressing a numerical key (0-9). Stop bit, address and scan repetition must be entered directly via the numerical key pad. The entry is terminated by pressing **<Edit/Input>**.

### 5.7 Service / Code

The menu point **Code** serves to generate the four-digit or six-digit numerical code number for the corresponding code level.

The currently saved code number is displayed in the information field next to the corresponding code levels. The new code number is entered in Edit mode.

#### Change code numbers:

Using the up/down cursor controls, select the **<Service/Code>** menu and confirm with **<Enter>** (Figure 32). Actuate **<Edit/Input>**, select the required line using the up/down cursor controls, implement the alterations and confirm with **<Enter>**. Entry is implemented via the numerical key pad (0-9). The entry is terminated by pressing **<Edit/Input>**.

Great care should be exercised when entering code level 3 (six-digit code number). The entered code number should be compared with the required code number before exiting the code menu.

#### Caution:

The code levels, particularly code level 3, should be recorded and kept in a safe place.

Figure

Service/Code		11:27
	Codenummer	
Level 1 =	00	
Level 2 =	0000	
Level 3 =	000000	
		3

## 5.8 Service / Date/Time

The menu point **Date/Time** serves to set the current date and the time.

The date with day/month/year is displayed and/or entered in the information field in the line "Date", the relevant day of the week for the set date in the line "Day", and the time in hours:minutes in the line "Time". Entry is implemented in the **Edit mode**.

**To change the date and time:**

Using the up/down cursor controls, select the **<Service / Date/Time>** menu and confirm with **<Enter>** (Figure 33). Actuate **<Edit/Input>**, select the required line using the up/down cursor controls, implement the alterations and confirm with **<Enter>**. The date and time are entered directly on the numerical key pad (0-9). The entry is terminated by pressing **<Edit/Input>**.

Figure

Service/Date-Time		11:32
<div> <div>TT/MM/JJ</div> <div>Date = 10/07/90</div> <div>Day = Di</div> <div>HH:MM</div> <div>Time = 11:32</div> </div>		
		3

## 5.9 Service / Time switch

The menu point Service/Time switch is used to load saved recipes at a required time. Up to a maximum of 8 recipes can be pre-selected.

The columns from left to right for recipe, day, date and time are displayed in the information field (Figure 34).

Figure

Service/Time Switch 15:37				
	Recipe	Day	Date	Time
1	5000-1	Sa	00/00	14:00
2	0000-1	OFF	00/00	00:00
3	0000-1	OFF	00/00	00:00
4	0000-1	OFF	00/00	00:00
5	0000-1	OFF	00/00	00:00
6	0000-0	OFF	00/00	00:00
7	0000-0	OFF	00/00	00:00
8	5000-0	OFF	00/00	00:00

### Recipe:

In the Recipe column, the required recipe number with the corresponding code number is entered. Entry is implemented in Edit mode using the numerical keyboard.

### Day:

In the Day column, you set the day of the week, daily, a certain date, via an external contact and the time switch function "OFF". Input is implemented in edit mode and the setting is selected by pressing one of the numerical keys in the following order and confirmed with <ENTER>. Upon entering a certain day of the week, daily, time switch to "OFF" or activation via an external signal, an entered date is ignored.

OFF = time switch function deactivated

MO = Monday

TU = Tuesday

WE = Wednesday

TH = Thursday

FR = Friday

SA = Saturday

SU = Sunday

DAI = daily

--- = weekday function deactivated. The time switch function is only activated on the entered date.

E1E = opt. input 1 (contact closed, E1E active)

E1A = opt. input 1 (contact open, E1A active)

E2E = opt. input 2 (contact closed, E2E active)

E2A = opt. input 2 (contact open, E2A active)

## Date:

In the Date column the day and the month when the recipe is to be loaded are entered. However, for this purpose, the day function in the Day column should be deactivated (---). Input is implemented in Edit mode using the numerical key pad and confirmed with the <ENTER> key.

## Time:

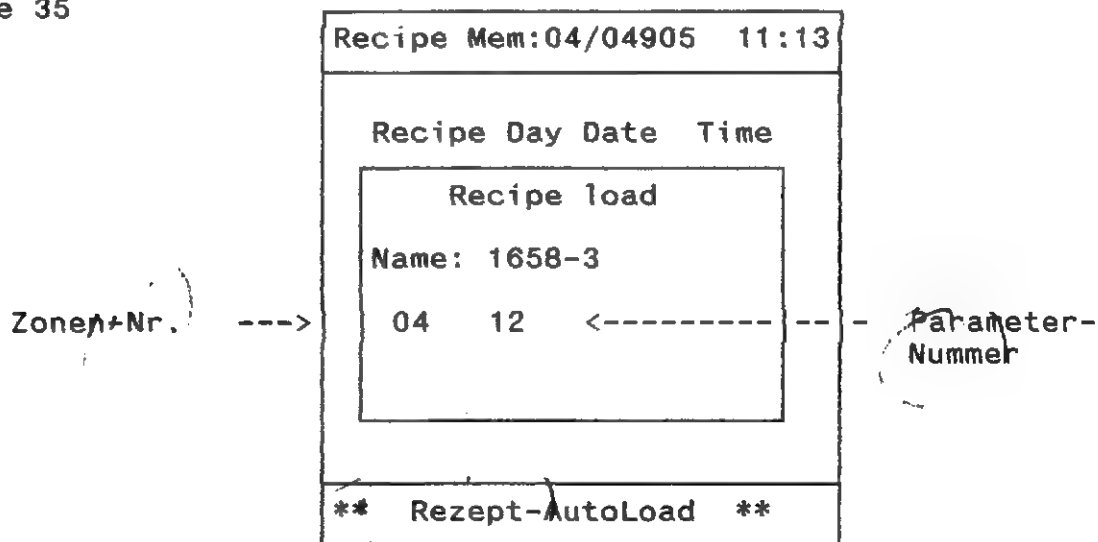
In the Time column, the time in hours:minutes at which the recipe should be loaded is entered. This applies both to the day setting and to the date setting. Input is implemented in Edit mode using the numerical key pad and is confirmed with the <Enter> key.

## To change the setting:

Using the up/down cursor controls, select the <Service/Time switch> menu and confirm with <Enter> (Figure 34). Actuate <Edit/Input>, select the required line or column using the left/right or up/down cursor controls, implement the alterations and confirm with <Enter>. The entry is terminated by pressing <Edit/Input>.

If the automatic loading procedure for a recipe is initiated by the time switch, this is indicated in the display (Figure 35).

Figure 35



## 5.10 Service / Diagnosis

The menu point **Diagnosis** is located in the **SERVICE/SET-UP** menu.

The following information is portrayed in this diagnosis:

**Elapsed time meter:** Displays the number of operating hours on the machine which have now elapsed.

**Power failure meter:** Displays all power failures in excess of 500 ms. This also includes switching off the system.

**Hardware reset meter:** Displays all mains failures less than 500 ms which cause the system to implement a hardware reset.

**ETR 94 E reset counter:** For service

Opt. inputs and relay outputs are determined as standard.

Figure 36

Service/diagnosis		11:26
Elapsed time	:	00002
Power failures	:	00014
Hardwarereset	:	00000
Opto Input: 1	Input: 2	
Relais Output:1	Output: 2	
ETR94E - reset counter		
00 00 00 00 00 00 00 00		

A reset can be implemented with the key combination <ENTER> and <C>. However, these two keys must be held down for several seconds.

## 6. Wiring instructions

Connections for the MBS are made via 2 female connectors with screw connections (Figure 37).

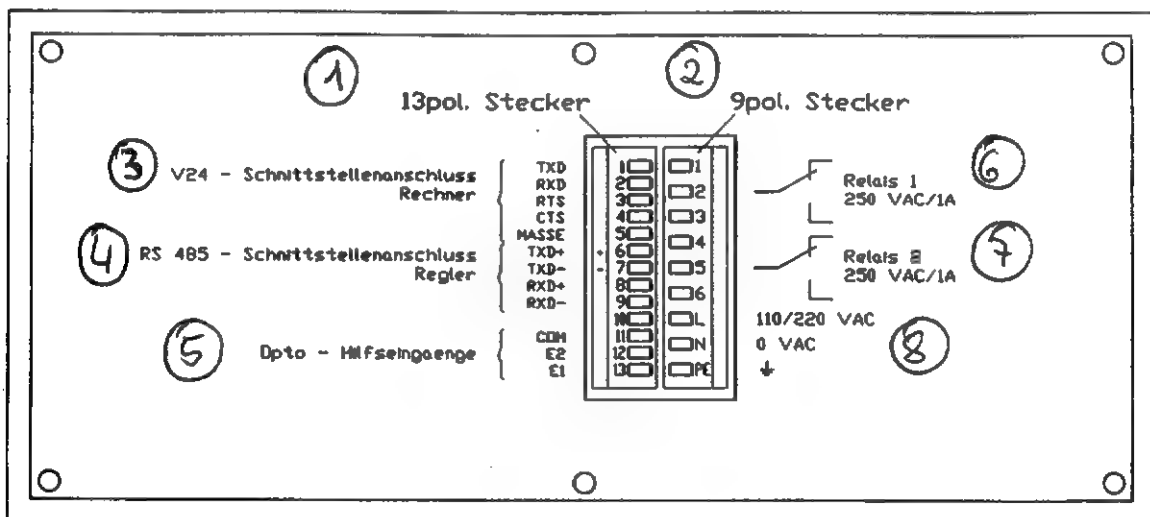
The 9-pole female connector is for the power supply of the MBS and the 2 floating changeover contacts of alarm relay 1 and 2nd alarm relay 1 = continuous alarm output as long as the alarm is present.

Alarm relay 2 = active in the event of a new alarm until alarm acknowledged.

The 13-pole female connector is envisaged for connection of a host computer via a V 24 interface, connection of the periphery cards via an RS 485 interface and two auxiliary inputs for external loading of recipes.

Wiring of the interface lines is conducted by means of a shielded line, whereby the shielding should only be applied on one side.

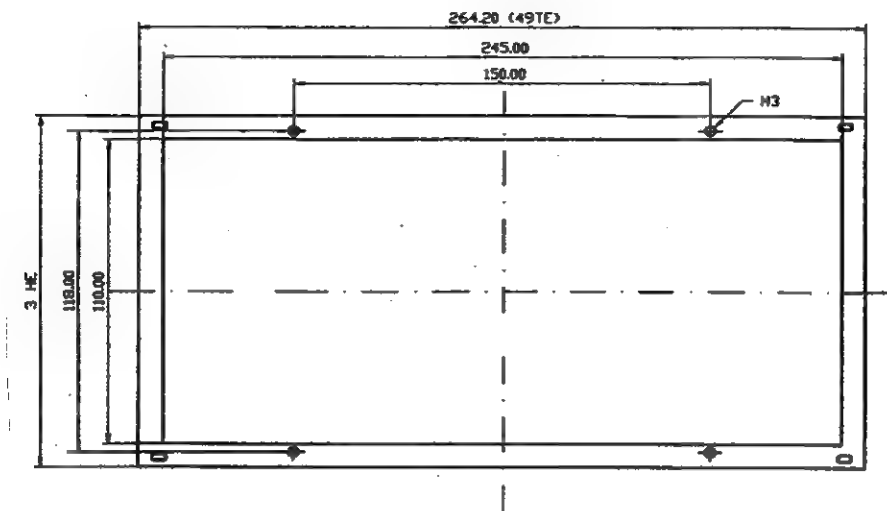
Figure 38



1. 13-pole connector
2. 9-pole connector
3. V 24 interface connection to computer
4. RS 485 interface connection to controller
5. Opt. auxiliary inputs
6. Relay 1
7. Relay 2
8. Earth

### Interface:

For information on connection of the periphery cards, please refer to data sheet.

**7. Technical specifications****Rear view MBS 900****Figure 39**

Dimensions: length x width x depth = 264.2 x 121.4 x 50mm

Power consumption: 60 mA

Processor: 80 C 154

Eprom: 64 kByte

RAM: 32 kByte

EEPROM: 64 kByte

Battery: lithium battery 3 VDC, service life > 10 years

Alarm relay 1:      Changeover contact, contact rating 250  
VAC/1 A. Designed as a centralised  
alarm signal.

Alarm relay 2:      Changeover contact, contact rating 250  
VAC/1 A. Designed as a new alarm signal,  
acknowledgement is implemented by  
activating the alarm menu.

Opt. input 1:      Auxiliary inputs for special functions,  
standard

Opt. input 2:      For external loading of recipes

**Interfaces:**

1.      RS 232 for connection of a host computer
2.      RS 485 for connection of periphery cards
3.      RS 232 via optical read head, connection directly  
on front of MBS 900

The host computer interface of the MBS is fitted as standard  
with an RS 232. However, the interface models RS 485 and 28  
mA 2-wire and 4-wire passive can also be supplied.

The transmission rate for the periphery cards is 9600 baud.

Scan time at 9600 baud is 80 ms per zone.

**Front layout:**

Membrane keyboard, LED display (dot matrix) with background  
illumination, resolution 27 x 16 characters, optical interface  
RS 232 for holding a read head.

**8. List of parameters**

No.	Parameter Abbreviation	Description	Range
1	Sow	Target value Target value	0-999°C
2	Ist	Actual value Actual value	0-999.9°C
3	Stg	Reg. ratio Regulation ratio	0-99%
4	StB	Actuator mode Actuator mode	OFF(ON)
5	Gw-	Limit value - Limit value -	0-999°C
6	Gw+	Limit value + Limit value +	0-999°C
7	IwI	Actual currentActual current	0-999.9 A
8	DeI	Current tolerance Current tolerance	0-99.9 A
9	SoI	Target currentTarget current	0-999.9 A
10	Iset	Current transfer Current transfer	OFF(ON)
11	Sow2	Targ.val.2/lower 2nd target value or lowering value	000-999°
12	XpH	Prop. band Proport. band, heating	0-9.9%
13	TdH	Rate time Rate time, heating	0-999 sec
14	TiH	Reset time Reset time, heating	0-9999 sec
15	TaH	Sampling time Sampling time, heating	0-99 sec
16	XpK	Prop. band Proport. band, cooling	0-9.9
17	TdK	Rate time Rate time, cooling	0-999
18	TiK	Reset time Reset time, cooling	0-99
19	TaK	Sampling time, c. Sampling time, cooling	0-99
20	Ada	Adaptation Adaptation	OFF(ON)
21	Ramp	Temp. increaseTemp. increase/min	0-999.9°C
22	StMH	Reg.rat. max hReg.ratio max., heating	0-99%
23	StMK	Reg.rat. max cReg.ratio max., cooling	0-99%
24	SoMin	Target val. min Minimum target value	0-999°C
25	SoMax	Target val. max Maximum target value	0-999°C
26	Offs	Act. val. offset Actual value offset	0-99°C
27	Anf	Start-up Transfer	ON(OFF)
28	A-Ata	Start-up adapt. Transfer	OFF(ON)
29	A-Kpa	Cooling adapt.Transfer	OFF(ON)
30	A-Stb	Actuator mode Transfer	OFF(ON)
31	Sw2F	2nd targ.v./low 2nd target value or lowering	LOWER (2nd TARG)
32	KLin	Cooling linearCooling linearisation	OFF(ON)
33	Rel-H	Relay output h. Relay output, heating	OFF(ON)
34	Rel-K	Relay output c. Relay output, cooling	OFF(ON)
35	Zone	Operating status Zone on/off	ON(OFF)

**No.1 Sow - Target value**

Next to this parameter, the currently set target value is displayed. This value can be altered by actuating the <EDIT> key. The range in which this parameter can be altered is between 0 and 999.

**No. 2 Ist - Actual value**

Next to this parameter, the current actual value of the temperature zone is displayed. The actual temperature value can be portrayed in the range from 0 to 999.9.

**No. 3 Stg - Regulation ratio**

This parameter indicates the current regulation ratio in % during normal regulation operation. The value corresponds to the heating or cooling output of a connected heating or cooling unit. If the regulation ratio is preceded by a minus symbol (e.g. -80%), this indicates that the controller is cooling at 80%.

If the parameter StB - actuator mode has been set to ON, at this point, the regulation ratio for actuator mode is entered. The regulation ratio can be set and displayed in the range from 0 to 99%.

**No. 4 StB - Actuator mode**

If this parameter is set to ON, the closed-loop control is disactivated and the controller operates in actuator mode. The regulation ratio is then entered in the parameter Stg - regulation ratio.

**No. 5 Gw- - Limit value -**

Next to this parameter, the user enters the number of °C by which the actual value may deviate from the target value without incurring an alarm signal. The lower temperature limit may be altered in the range from 0-999°C.

**No. 6 Gw+ - Limit value +**

Next to this parameter, the user enters the number of °C by which the actual value may deviate from the target value without incurring an alarm signal. The upper temperature limit may be altered in the range from 0-999°C.

**No. 7 IwI - Actual current**

Next to this parameter, the current actual value of the temperature zone is displayed. The current actual value can be portrayed in the range from 0 to 999.9 A.

**No. 8 DeI - Current tolerance**

Next to this parameter, the user enters the number of A by which the current actual value may deviate from the current target value without incurring an alarm signal. The current tolerance can be altered in the range from 0 - 99.9 A.

**No. 9 SoI - Target current**

This parameter serves to specify the target current for heating current monitoring. If the power consumption of the heating is known (e.g. from the rating plate), this can be directly entered at this point. If the power consumption is not known, it is possible to measure the current via the parameter Iset - current transfer and transfer it as the target current. The target current can be altered in the range from 0 - 999.9 A.

**No. 10 Iset - Current transfer**

This parameter is used for automatic current transfer of the actual current as the target current. If this parameter is set to ON, the heating is switched on for 20 ms, the power consumption measured, and the measured current transferred into the parameter SoI - Target current. This makes it unnecessary to implement measurements using a clip-on ampere meter or separate the cable for measurement of the current. Upon switching from OFF to ON, the parameter automatically switches back to OFF.

**No. 11 Sow2 - Targ. val. 2/lower**

This parameter serves on the one hand, as a 2nd target value and on the other, as a lowering parameter. Activation is implemented via a floating contact and switching between the 2nd target value and lowering temperature in the parameter Sw2F - 2nd targ. val./lower.

**2nd target value:**

For the second target value, an absolute lowering temperature is entered e.g. 120°C. After closure of the floating contact, the target value is set to 120°C.

**Lowering:**

For lowering, the temperature by which the target value should be reduced is entered.

**Example:** Target value = 230°C  
Sow2 = 80°C

This example would mean that upon activating lowering via the floating contact, the temperature will be lowered from 230°C to 150°C (-80°C).

**No. 12 XpH - Proportional band (for heating)**

The proportional band for heating is displayed and entered after this parameter. The proportional band is the range in which the controlled variable (actual value) can be influenced.

The larger the proportional band, the larger the deviation, the smaller the oscillation.

The smaller the proportional band, the smaller the deviation, and the larger the risk of oscillation.

This parameter can be altered in the range from 0 - 9.9%.

If the controlled system has been calculated by adaptation, this value will not normally need to be altered.

**No. 13 TdH - Rate time (for heating):**

The rate time is the time required by the P controller to retain the same deflection which the D controller achieves immediately with a constant rate of change of the control variable (actual value).

In simplified terms, it could be said that the rate time is the time by which a PID controller is faster than a pure P controller.

This parameter can be altered in the range from 0 - 9999 sec.

If the controlled system has been calculated by adaptation, this value will not normally need to be altered.

**No. 14 TiH - Reset time (for heating):**

The reset time is the time required by the I controller to achieve the same alteration as the manipulated variable which is adjusted immediately as a result of the effect of the P controller.

In simplified terms, it could also be said that the reset time is the time by which a PID controller is faster than a pure I controller.

This parameter can be altered in the range from 0 - 9999 sec.

If the controlled system has been calculated by adaptation, this value will not normally need to be altered.

**No. 15 TaH - Sampling time (for heating):**

The sampling time indicates how often the controlled system is scanned (the actual value is measured). The faster the controlled system, the smaller the sampling time.

**No. 16 XpK - Proportional band (for cooling)**

The proportional band for cooling is displayed and entered after this parameter. The proportional band is the range in which the controlled variable (actual value) can be influenced.

The larger the proportional band, the larger the deviation, the smaller the oscillation.

The smaller the proportional band, the smaller the deviation, and the larger the risk of oscillation.

This parameter can be altered in the range from 0 - 9.9%.

If the controlled system has been calculated by adaptation, this value will not normally need to be altered.

**No. 17 TdK - Rate time (for cooling):**

The rate time is the time required by the P controller to retain the same deflection which the D controller achieves immediately with a constant rate of change of the control variable (actual value).

In simplified terms, it could be said that the rate time is the time by which a PID controller is faster than a pure P controller.

This parameter can be altered in the range from 0 - 9999 sec.

If the controlled system has been calculated by adaptation, this value will not normally need to be altered.

**No. 18 TiK - Reset time (for cooling):**

The reset time is the time required by the I controller to achieve the same alteration as the manipulated variable which is adjusted immediately as a result of the effect of the P controller.

In simplified terms, it could also be said that the reset time is the time by which a PID controller is faster than a pure I controller.

This parameter can be altered in the range from 0 - 9999 sec.

If the controlled system has been calculated by adaptation, this value will not normally need to be altered.

**No. 19 TaK - Sampling time (for cooling):**

The sampling time indicates how often the controlled system is scanned (the actual value is measured). The faster the controlled system, the smaller the sampling time.

**No. 20 Ada - Adaptation**

Adaptation is the parameter under which calculation of the controlled system is implemented. If this parameter is set to ON, a dialog field will then appear in which the new target value can be specified. This should not be 40°C greater than or 30°C less than the current actual value in order to be able to implement a very precise calculation.

**No. 21 Ramp - Temperature increase**

This specifies how quickly the entered target value should change. Normally, the entered target value is accepted directly by the controller. This parameter enables the target value to be increased, not suddenly, but via a ramp. The entered value then determines the number of degrees by which the target value may change in a minute. Entry is in °C/minute.

**No. 22 StMH - Regulation ratio maximum, heating:**

This parameter is used to limit the maximum possible regulation ratio in an overdimensioned heating system. This avoids overshooting. The behaviour of the controlled system becomes slower as a result.

**No. 23 StMK - Regulation ratio maximum, cooling:**

This parameter is used to limit the maximum possible regulation ratio in an overdimensioned cooling system. This avoids overshooting. The behaviour of the controlled system becomes slower as a result.

**No. 24 SoMin - Target value, minimum:**

This parameter enables you to specify the minimum possible target value. This can prevent the plant from freezing as a result of an incorrect target value entry. Accordingly, it is not possible to enter a target value which is smaller than the minimum target value specified here.

**No. 25 SoMax - Target value, maximum:**

This parameter enables you to specify the maximum possible target value. Accordingly, it is not possible to enter a target value which is larger than the maximum target value specified here.

**No. 26 Offs - Actual value offset:**

This parameter is used to balance a thermal sensor. The offset range can be altered from -99 to +99 tenths of a degree. Entering -05 means that the actual value is displayed 0.5 degrees lower. The minus is entered via the "." key.

**No. 27 Anf - Start-up:**

This parameter is used for zone-specific activation and disactivation of the regulation ratio ramp and the start-up time. The regulation ratio ramp and start-up time are set in the SET-UP/SERVICE menu under Cards. For further details, please refer to Chapter 5.2, page 34.

**No. 28 A-Ata - Start-up adaptation**

If this parameter is set to ON, the controlled system is then automatically re-calculated if there is a temperature difference of greater than 40°C from the actual value. This means that the controller implements a new adaptation.

**No. 29 A-Kpa - Cooling adaptation**

If this parameter is set to **ON**, the controlled system is automatically re-calculated if there is a temperature difference of less than 30°C than the actual value. This means that the controller implements a new adaptation.

**No. 30 A-Stb - Actuator mode:**

If this parameter is set to **ON**, after detecting a sensor rupture, the controller continues to control in actuator mode using the previously calculated regulation ratio.

Caution: If the regulation ratio was formerly calculated at 99%, following sensor rupture, the controller will continue to control in actuator mode with a regulation ratio of 99%.

**No. 32 Sw2F - 2nd targ. val./lower:**

This parameter is used to switch between whether a 2nd target value or a lowering temperature is active following closure of a floating contact. The relevant value is entered in the parameter **Sow2 - targ. val. 2/lower**.

**No. 32 KLin - Cooling linear:**

This parameter serves to utilise extreme cooled systems (water cooling) which are to be operated with a smaller regulation ratio.

**No. 33 Rel-H - Relay output, heating:**

If contactors are used as actuators for the heating, this parameter must be set to **ON**. This means that the contactor is not triggered with a minimal pulse of 20ms (50Hz), but with 100ms (10Hz). This time depends on the regulation ratio. This parameter reduces the switching frequency of the relay contacts, thereby increasing the service life of the contactors.

**No. 34 Rel-K - Relay output, cooling:**

If contactors are used as actuators for cooling, this parameter must be set to **ON**. This means that the contactor is not triggered with a minimal pulse of 20ms (50Hz), but with 100ms (10Hz). This time depends on the regulation ratio. This parameter reduces the switching frequency of the relay contacts, thereby increasing the service life of the contactors.

**No. 35 Zone - Operating status:**

This parameter activates and disactivates the zone. If this parameter is set to **OFF**, no alarm messages are issued externally.

**9. Instructions for commissioning**

After connecting the supply voltage, the RS 485 interface for the periphery cards and switching on the MBS, the switch-on screen will appear for approximately 10 seconds. This contains the current software no. of the MBS program (e.g. 047500) and a message regarding the EPROMS, EEPROM and RAM checked after switching on. "OK" indicates that they are in correct working order; otherwise, an error message will appear.

Monitor operating station

\*\*\*\* M B S - 900 \*\*\*\*

Software no. 047500

EPROM -----> OK

EEPROM -----> OK

RAM 32K ----> OK

PSG - plastic service gmbh

After approximately 10 seconds, the system will automatically switch to the overview mask.

Schedule for initial commissioning:

Configuration

- Enter code level three (six-digit code number); see 2.1
- Call up the Service/Set-up menu via the function key; see 5.
- Implement card configuration in the Service/Cards menu; see 5.2
- Implement zone allocation in the Service/Zone allocation menu; see 5.4
- Configure the overview mask in the Service/Overview menu; see 5.1
- In the Service/Zone menu, determine which of the existing parameters should be masked out, displayed only or displayed and editable under which code level in the Recipe menu and Zone/Loop menu; see 5.3
- Configure the required alarm messages in the Service/Alarm menu; see 5.5.
- Enter the current date and time (if necessary) in the Service / Date/Time menu; see 5.8.
- Re-enter the code numbers of the three code levels (if necessary) in the Service Code menu; see 5.7.

Following configuration of the MBS and the connected periphery cards, call up the Zone/Loop menu via the function key, and the required settings for each connected zone, such as limits, minimum and maximum temperature, adaptation and zone.

Activation of the ramp function for each zone should not be implemented until after the system is commissioned for the first time, because otherwise, parameter calculation for the connected zone will no longer be possible.

Exit the Zone/Loop menu and call up the overview mask. In the overview mask, each zone will then be approached individually in sequence. When setting the target value, care should be taken to ensure that the target value is 40°C greater than the actual value (for automatic parameter calculation via start-up adaptation).

Once all connected zones are correct, commissioning is complete.

Practice has shown that it is expedient to deactivate all adaptations following commissioning and once production has started. This prevents the possibility of forgetting a heating connection when starting up again following maintenance or repair and calculating incorrect parameters with adaptation ON.

**10. Front interface**

Using the front interface, it is possible to read or load data from the MBS via a read head and the MBS 900 master program. For this purpose, the master head is mounted in such a way that the notch is vertical in the centre of the rear of the head housing, and the connection cable is pointing downwards. The read head is held on the MBS by a permanent magnet. The data transfer can then be implemented via the MBS 900 master program. For a description, please refer to the MBS 900 master program.

Figure 37

